RIVERS AND FLOODS.

By H. C. FRANKENFIELD, Meteorologist.

The only floods east of the Mississippi River were very moderate ones in the Roanoke River of North Carolina and the Saluda and Santee Rivers of South Carolina. The Santee flood was simply the end of the August flood, while the Saluda flood was a one-day flood on the first day of the month, for which warnings had been issued on August 29. The flood was caused by heavy rains in the Piedmont section. The Roanoke flood was very local in character and no warnings were issued.

General rains fell over the State of Oklahoma from September 14 to 19, inclusive, with heavy rains on September 18 and 19. As a result high water was experienced in all streams of the State, although there were no flood stages except in the North Canadian River, where the flood stages were quite generally, although but slightly, exceeded on September 20 and 21, and again on September 25 at Oklahoma City on account of additional heavy rains above. Low bottom lands along the North Fork, and a small section of Oklahoma City were flooded, but the damage was slight. Warnings were issued on September 19 and again on September 22, for the lower river flood.

On the evening of September 26, a tornadic storm, mentioned elsewhere in this REVIEW, occurred in the vicinity of Halstead, Sedgwick, Newton and Hesston, Kans. The storm lasted only about six hours, but the rainfall measured from 4.52 to 9 inches. Naturally, all streams in the territory covered rose rapidly and decidedly to above the flood stages, especially the Little Arkansas River. At Sedgwick on this river the crest stage of 24.8 feet on the afternoon of September 27 was 6.8 feet above the flood stage, and at Wichita, Kans., on the Big Arkansas River, the crest stage of 10.5 feet on the morning of September 29, was 1.5 feet above flood stage. At the Shrine Clubhouse on the Little Arkansas River at Wichita, the crest stage was materially lowered to 1.5 feet above the flood stage of 12 feet by diverting some of the flood waters through the canal into Chisholm Creek.

About one-quarter square mile of territory within the city of Wichita was flooded by overflow waters from Chisholm Creek, and about one-half square mile of residence section along the Little Arkansas River. Along the Big Arkansas River the damage was slight.

Warnings were issued promptly on the morning of September 27, and distributed as widely as possible.

Losses as reported totaled $43,000, of which $18,000 was to bridges and highways and $14,000 to crops. Crop losses were small as most crops had been harvested.

Precipitation was general over Wyoming from September 27 to 30, inclusive, and heavy on September 27 and 28 over the drainage area of the North Platte River, the rainfall ranging from 1 to nearly 3½ inches. As a result the North Platte River and its tributaries rose rapidly, At Coal Creek, Wyo., about 14 miles east of Casper, a washout during the night of September 28 caused a disastrous railroad wreck, a locomotive and a number of cars dropping into the streams, causing the loss of at least 17 lives, and very probably more. Coal Creek empties into the North Platte River within a few yards of the scene of the accident.

From the Wyoming-Nebraska line to North Platte, Nebr., the North Platte River rose rather more than 2 feet on an average, and at North Platte the crest stage was 6.0 feet, or 1 foot above the flood stage. East of North Platte the crest flattened out considerably. The excessive rainfall of September 28 also caused severe local floods in the vicinity of Omaha, Nebr., and Council Bluffs, Iowa, entirely through overflows of small tributaries. At Louisville, Nebr., about 20 miles southwest of Omaha, the flood waters from Mill Creek drowned 12 persons in one house as it was swept downstream. Several bridges were washed away and a large number of houses wrecked. Across the Missouri River in Council Bluffs, Iowa, conditions were much the same and six lives were lost in the city.

It is impossible, of course, to issue warnings for the floods in small streams that are caused by torrential rains of short duration, but for the North Platte River in Nebraska, advisory warnings were issued in ample time. The damage reported amounted to about $760,000, although there is reason to believe it was much more. Of this amount about $500,000 fell to the State of Wyoming. No estimate of the losses on the Iowa side of the Missouri River has been received.

Almost similar conditions prevailed on September 30, in the Powder River Valley of southeastern Montana and northeastern Wyoming, and overflow waters from Goose Creek inundated the northern and eastern sections of the city of Sheridan, Wyo. No estimate of the damage caused by this flood has been received, but it must have been great, as in the vicinity of Broadus, Mont., the Powder River overflow water was reported to have covered the landscape for miles and miles. Fortunately no lives were lost.

During the early part of the month heavy rains in eastern Mexico and southern Texas caused severe floods in the lower Rio Grande, and before the flood waters had receded to any extent, additional heavy rains caused a second flood of almost similar proportions. At Rio Grande City, Tex., the crest of the first flood was 23.3 feet on September 11, and of the second, 21.5 feet on September 22. Flood stage is at 15 feet. Below Rio Grande City the first flood overtook the second one and flood stages continued at the close of the month.

While the flood stage was not reached at Eagle Pass, Tex., the low bridge at that place was carried away on September 17. Levees gave way near Mercedes, Tex., and a portion of the country for 20 miles to the northward was flooded. The floods caused damage amounting to $80,000, of which $40,000 was to highways, levees and bridges, and $40,000 to crops and business interests.

Warnings for these floods were first issued on September 8, and continued daily thereafter.

There was a flood in the Colorado River of Arizona from the Utah line to Topock. At the time a survey party of the United States Geological Survey was working in the Grand Canyon of the Colorado, and it was supplied with a radio outfit for communication with the Los Angeles, Calif., Times. Warnings were sent to the Times on September 18, and additional warnings of dangerously high stages were sent on the following day when the stage at Grand Canyon, Ariz., was 25.2 feet, rising, with a discharge of 101,400 second-feet. The crest stage at Grand Canyon was 27.5 feet at 6.30 p. m., September 19. Unfortunately the radio apparatus in the canyon failed to function properly, and the warnings were not received. However, the surveying party suffered no casualties.

Warnings were also issued on September 20, for the lower Colorado River, but, as the flood had probably been more or less local in character, the peak of the flood became considerably depressed in its progress along the lower Colorado, and the floods failed to materialize.

Heavy and almost continuous rains fell over northeastern Arizona from September 16 to 18, inclusive, and for several days that portion of the State east of Flagstaff was cut off from the remainder of the State. The main line of the Atchison, Topeka & Santa Fe Railroad was put out of commission by washouts, State highways were rendered impassable, and telegraph and telephone communication suspended. The principal damage occurred at and in the vicinity of the town of Holbrook at the junction of the Rio Puerco and Little Colorado Rivers, where many buildings, including residences, were washed away and one life was lost. Streets were inundated and much property along the river banks carried away by erosion. Trains were rerouted through western New Mexico and southern Arizona, and one such train en route from Phoenix, Ariz., northward, was wrecked near Wickenburg, Ariz., resulting in the death of four persons. The rainfall at Wickenburg during September 17 and 18 amounted to 4.50 inches.

Flood stages during September.

River and station.	Flood stage.	Above flood stages—dates.		Crest.	
		From—	To—	Stage.	Date.
ATLANTIC DRAINAGE.					
	Feet.			*Feet.*	
Roanoke: Weldon, N. C.	30	25	25	30.0	25
Saluda: Chappels, S. C.	14	1	1	14.4	1
Santee:					
Rimini, S. C.	12	(1)	4	13.2	2
Ferguson, S. C.	12	2	7	12.5	5
MISSISSIPPI DRAINAGE.					
Arkansas: Wichita, Kans.	9	28	29	10.5	29
Purgatoire: Higbee, Colo.	4	18	18	5.0	18
Little Arkansas:					
Sedgwick, Kans.	18	27	28	24.8	27
Hellers Grove, Kans.	12	14	15	15.4	14–15
Midian Shrine, Kans. (Wichita, Kans.).	12	28	28	13.5	28
Canadian, North Fork:					
Woodward, Okla.	3	18	21	5.3	19
Canton, Okla.	4	20	20	4.2	20
Oklahoma City, Okla.	12	20	20	12.2	20
Do.	12	23	25	13.3	24
WEST GULF DRAINAGE.					
Nueces: Cotulla, Tex.	15	7	10	16.0	7
RIO GRANDE DRAINAGE.					
Rio Grande:					
Mission, Tex.	24	12	13	24.5	13
Do.	24	23	25	25.4	24
Rio Grande City, Tex.	15	9	13	23.3	11
Do.	15	21	24	21.5	22
San Benito, Tex.	21	10	(2)	23.3	22–25
COLORADO DRAINAGE.					
Colorado: Lees Ferry, Ariz.	12	20	20	13.5	20

[1] Continued from August.
[2] Continued into October.

MEAN LAKE LEVELS DURING SEPTEMBER, 1923.

By UNITED STATES LAKE SURVEY.

[Detroit, Mich., October 3, 1923.]

The following data are reported in the "Notice to Mariners" of the above date:

Data	Lakes.[1]			
	Superior.	Michigan and Huron.	Erie.	Ontario.
Mean level during September, 1923:	*Feet.*	*Feet.*	*Feet.*	*Feet.*
Above mean sea level at New York	602.10	579.64	571.55	245.03
Above or below—				
Mean stage of August, 1923	+0.04	−0.12	−0.15	−0.38
Mean stage of September, 1922	−0.56	−0.73	−0.77	−1.00
Average stage for September last 10 years	−0.66	−1.09	−0.94	−1.16
Highest recorded September stage	−1.98	−3.79	−2.39	−2.58
Lowest recorded September stage	+0.61	−0.02	+0.27	+1.03
Average relation of the September level to:				
August level	.....	−0.2	−0.3	−0.4
October level	.....	+0.2	+0.3	+0.4

[1] Lake St. Clair's level: In September 574.49 feet.

EFFECT OF THE WEATHER ON CROPS AND FARMING OPERATIONS, SEPTEMBER, 1923.

By J. B. KINCER, Meteorologist.

The weather during September was favorable, in the main, for field work and farming operations made satisfactory advance in most sections of the country. The soil condition was especially favorable for the preparation for wheat seeding in the central valleys and Great Plains States, and there was sufficient rain for improvement in the far Northwest.

Threshing small grains made rapid progress in the more northwestern districts, but in some parts of the upper Mississippi Valley, especially in Iowa, frequent rains were rather unfavorable for threshing oats, though conditions improved after the first few days of the month. Rainfall in the lower Great Plains was particularly timely for the preparation of wheat land in some sections where it had been too dry. At the close of the month the soil had again become too dry in the more northwestern States.

Unseasonably cool weather prevailed in north-central districts about the middle of the month, when freezing temperatures occurred in numerous localities in the northern border States from North Dakota eastward. Heavy to killing frosts occurred in most sections of Minnesota and Wisconsin, with severe damage to some crops, particularly to late truck and gardens. There was also a varying amount of frost damage in Iowa, northern Illinois, central and northern Indiana, Ohio, New York,